Marvair®
AIRXCEL®, Inc.
ISO 9001 2000 REGISTERED COMPANY

Classic HVPA & HVPSA Heat Pumps

MAINTENANCE & SERVICE

Models HVPA24-30-36-42-49-60 & HVPSA36-42-49-60

CAUTION!!

Read all instructions before use. Retain this manual for future reference. This equipment should be installed and serviced only by a trained professional HVAC service person.

Due to continuous product improvement, use only the current issue of this manual. The latest version can be downloaded from the Marvair website - www.marvair.com.

ARI PERFORMANCE CERTIFIED
ARI Standard 390

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SECTION 15700

HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

MAINTENANCE & SERVICE MANUAL

FOR CLASSIC™ HEAT PUMP

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SECTION 15700

HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

The purpose of this manual is to provide instructions for maintenance and service for the Marvair® Classic™ series of heat pumps. In addition to this manual, there are other pieces of literature available from Marvair. The Product Manual covers the installation of the unit and various accessories and the initial start-up of the unit. An overview of the product line can be found in the Classic Product Data Sheets. The current version of this literature can be found and downloaded from the Marvair website at www.marvair.com.

To minimize sound levels within the classroom, certain options should be selected. These options are designated by throughout the guideline.

1.1 GENERAL OPERATION

A. Classic™ heat pumps are designed to provide quiet comfort to the classroom.

In cooling mode, the compressor will cycle on to provide the cooling required. The system provides cooling, dehumidification and air circulation.

In heating mode the compressor (heat pump only) will cycle on to provide the heating required. The system provides heating and air circulation. At lower outdoor temperatures, additional heating capacity may be provided by an optional electric resistance heater.

Ventilation air may be provided by the manual or motorized fresh air vent, power vent or GreenWheel® ERV. These ventilation systems operate when there is a call for cooling or heating or independently to provide fresh air. Note that with the manual, motorized fresh air vent and the power vent options, if the compressor is not operating and the indoor blower is running, unconditioned outside air is being introduced into the classroom. The GreenWheel ERV provides tempered outside air.

Control systems are either a remote external thermostat, internal thermostat, or a direct digital control interfacing with the building automation system (BAS).

Hot Gas Reheat (HGR) Dehumidification (Option). To provide on demand dehumidification, the Classic™ heat pump can have a factory installed hot gas reheat coil to allow dehumidification through continued cooling with discharge air reheated to avoid over cooling the classroom. The operation of the HGR is controlled by a three-way heat reclaim valve. The HGR coil is sized to provide a heating capacity approximately equal to the sensible capacity of the unit When the demand for cooling is satisfied and the humidity controller calls for dehumidification, hot gas is directed to a reheat coil downstream from the evaporator coil to add heat to the dehumidified, chilled air supplied to the classroom. Hot gas reheat is available with motorized fresh air, PowerVent and GreenWheel® ventilation systems.

Marvair® recommends that for optimum performance, hot gas reheat be used in conjunction with the GreenWheel® heat recovery ventilator. When used with other ventilation options, hot gas reheat may not maintain satisfactory control of the humidity in the classroom over all outdoor conditions.

1.2 MODEL IDENTIFICATION

The Classic™ heat pump identification numbering system is shown below. The model identification number is on the data label. The data label is at the bottom of the of left side panel.

Model Identification - Model AVP

AVP •• HP • • • • •

Color
100=Beige, 200=Grey, 300=Brown, 400=White, 600=Dark Bronze,
The standard Classic heat pump cabinet color is beige. White, dark bronze, grey, and brown units are also available. Please consult the factory for pricing on units.

Options
D = Extreme Duty Package K = Coastal Environmental Package U = Scroll Compressor
E = Extreme Duty Package R = Electric Reheat Dehumidification G = HGR (Hot Gas Reheat)

Ventilation Code
N = 0-15% fresh air with manual damper, no presure relief
Y = 0 to 450 cfm* of outside air, field adjustable, manual damper, no pressure relief
Z = 0 to 450 cfm* of outside air, field adjustable, manual damper, includes pressure relief
B = Motorized two position damper (open & closed) capable of 0 to 450 cfm* of outside air, includes pressure relief
C = Economizer - 100% rated airflow of outside air used for cooling when outside conditions are suitable
H = GreenWheel® Energy Recovery Ventilator

Electric Heat (kW)
000 = No Heat 050 = 5 kW 060 = 6 kW 080 = 8kW 090 = 9 kW 100 = 10 kW 150 = 15 kW

Power Supply
A = 208/230V, 1 Ph, 60 Hz C = 208/230V, 3 Ph, 60 Hz D = 460V, 3 Ph, 60 Hz

System Type
Heat Pump

Nominal Cooling*
24 = 24,000 BTUH 30 = 29,400 BTUH 36 = 35,000 BTUH 42 = 42,500 BTUH 48 = 48,000 BTUH 60 = 57,000 BTUH

Air Source Vertical Package

Model Identification - Model HVP

HVP •• HP • • • • •

Color
100=Beige, 200=Grey, 300=Brown, 400=White, 600=Dark Bronze,
The standard Classic heat pump cabinet color is beige. White, dark bronze, grey, and brown units are also available. Please consult the factory for pricing on units.

Options
D = Extreme Duty Package K = Coastal Environmental Package U = Scroll Compressor
E = Extreme Duty Package R = Electric Reheat Dehumidification G = HGR (Hot Gas Reheat)

Ventilation Code
N = 0-15% fresh air with manual damper, no presure relief
Y = 0 to 450 cfm* of outside air, field adjustable, manual damper, no pressure relief
Z = 0 to 450 cfm* of outside air, field adjustable, manual damper, includes pressure relief
B = Motorized two position damper (open & closed) capable of 0 to 450 cfm* of outside air, includes pressure relief
C = Economizer - 100% rated airflow of outside air used for cooling when outside conditions are suitable
H = GreenWheel® Energy Recovery Ventilator

Electric Heat (kW)
000 = No Heat 050 = 5 kW 090 = 9 kW 100 = 10 kW 150 = 15 kW

Power Supply
A = 208/230V, 1 Ph, 60 Hz C = 208/230V, 3 Ph, 60 Hz D = 460V, 3 Ph, 60 Hz

System Type
Heat Pump

Nominal Cooling*
24 = 24,000 BTUH 30 = 29,400 BTUH 36 = 35,000 BTUH 42 = 42,500 BTUH 49 = 49,000 BTUH 60 = 57,000 BTUH

High Efficiency Vertical Package

Model Identification - Model HVPA

HVPA •• HP • • • • •

Color
100=Beige, 200=Grey, 300=Brown, 400=White, 600=Dark Bronze,
The standard Classic heat pump cabinet color is beige. White, dark bronze, grey, and brown units are also available. Please consult the factory for pricing on units.

Options
D = Extreme Duty Package K = Coastal Environmental Package U = Scroll Compressor
E = Extreme Duty Package R = Electric Reheat Dehumidification G = HGR (Hot Gas Reheat)

Ventilation Code
N = 0-15% fresh air with manual damper, no presure relief
Y = 0 to 450 cfm* of outside air, field adjustable, manual damper, no pressure relief
Z = 0 to 450 cfm* of outside air, field adjustable, manual damper, includes pressure relief
B = Motorized two position damper (open & closed) capable of 0 to 450 cfm* of outside air, includes pressure relief
C = Economizer - 100% rated airflow of outside air used for cooling when outside conditions are suitable
H = GreenWheel® Energy Recovery Ventilator

Electric Heat (kW)
000 = No Heat 050 = 5 kW 090 = 9 kW 100 = 10 kW 150 = 15 kW

Power Supply
A = 208/230V, 1 Ph, 60 Hz C = 208/230V, 3 Ph, 60 Hz D = 460V, 3 Ph, 60 Hz

System Type
Heat Pump

Nominal Cooling*
24 = 24,000 BTUH 30 = 29,400 BTUH 36 = 35,000 BTUH 42 = 42,500 BTUH 49 = 49,000 BTUH 60 = 57,000 BTUH

High Efficiency Vertical Package with R410-A Refrigerant

IMPORTANT
WHEN CLASSIC SYSTEMS ARE INSTALLED, MODEL NUMBER AND SERIAL NUMBERS ARE TO BE RECORDED AND MAINTAINED IN A LOCATION FOR IMMEDIATE ACCESS WHEN REQUESTING FURTHER INFORMATION.

2.1 START-UP PROCEDURE

Important: If your unit has a crankcase heater be sure that the crankcase heater has been energized for at least 24 hours prior to start-up of the unit. Double check all electrical connections before applying power. Various thermostats can be used to control the heat pump. The thermostat may have a fan switch with an Automatic and On positions, a system switch with Heat, Cool, and Off positions, and an emergency heat position with lights. The spec sheets have detailed description of the various Marvair® thermostats. Since other thermostats or remote control systems may be used, the following procedures should be viewed as guidelines for standard thermostats with system and fan switches.

Check-out of Cooling Cycle

Procedure:

Classic™ Heat Pump

1. Set the fan switch to "Auto" and the system switch to "Off".
2. Move the cooling temperature on the wall thermostat to a point **higher** than the room temperature. Move the heating temperature to a temperature that is **lower** than the room temperature.
3. Set the thermostats system switch to "Cool" or "Auto" position. Nothing should operate at this time.
4. Set the time delay in the control box to three minutes. Note that time delay is an option on some Classic™ units and may not be on your heat pump.
5. Remove the cover plate from the thermostat. Slowly lower the thermostat cooling temperature. Once the indoor fan turns on, allow approximately three minutes for the compressor and outdoor fan to start.

   For units equipped with the low ambient control, note that the outdoor fan may not come on immediately, because it is cycled by refrigerant pressures. Some units have a time delay module which prevents the compressor from restarting immediately after interruption of power. See section 1.5P and 1.5Q for details on the operation of the low ambient control and the time delay.

   If the unit fails to operate, refer to the troubleshooting information in Chapter 6.1.

Classic™ Heat Pump with Economizer

1. Set the fan switch to "Auto" and the system switch to "Off".
2. Set the cooling temperature on the wall thermostat to a point **higher** than the room temperature. Set the heating temperature to a temperature that is **lower** than room temperature.
3. Set the thermostat system switch in the "Auto" or "Cool" position. Nothing should operate at this time.

4. Set the time delay in the **Classic™ Heat Pump with Economizer** control box to 3 minutes. Check the enthalpy changeover setting of the H205A or dry bulb sensor, and reset it if needed. Refer to the Owner's manual for instructions on setting the H205A or dry bulb sensor.

5. Slowly lower the thermostat's cooling temperature. The indoor fan should operate.

   Once the indoor fan comes on, allow approximately three minutes for the compressor to start. Note that the outdoor fan may not come on immediately because it is cycled by refrigerant pressures

   Note: To check the system operation under different ambient conditions, the air temperature and enthalpy sensors must be "tricked". When outdoor ambient conditions are higher than the control setting, a component aerosol cooler may be sprayed directly into the enthalpy sensor to simulate low enthalpy conditions, causing the economizer damper to open.

   Alternately, when outdoor conditions are lower than the set point, a source of heat such as a hair dryer can be directed on the air temperature sensor to simulate warmer conditions, which will bring on mechanical cooling and start the compressor.

   If the unit fails to operate, refer to the troubleshooting information in Chapter 6.1.

Check-Out of Heating Cycle

Procedure:

1. Place the thermostat system switch to "Auto" or "Heat" and the fan to "Auto".

2. Raise the heating temperature to a setting which is higher than the room temperature. The fan and compressor should cycle on after time delay (standard on Classic™ heat pump with economizer and all HVP models, option on all other Classic units) has cycled.

3. Move the system switch to the "Off" position. All functions should stop.

   The Blower Timed Delay Relay (BTR) keeps the blower running for 90 seconds after the unit shuts off.

   Note: The damper blade should remain closed during the heating cycle (unless the minimum position potentiometer has been set for constant ventilation).

2.2 VENTILATION SYSTEM CALIBRATION

Manual Fresh Air System (Configuration N). This is the standard ventilation system in the Classic™ heat pump. Fresh air ventilation by means of a damper can provide up to 15% of rated air flow of outside air. The damper has four positions corresponding to 0, 5, 10 and 15% of rated air flow of outside air.

The damper only opens when the indoor fan is operating. Position the screw on the side of the damper hood for the desired air flow.

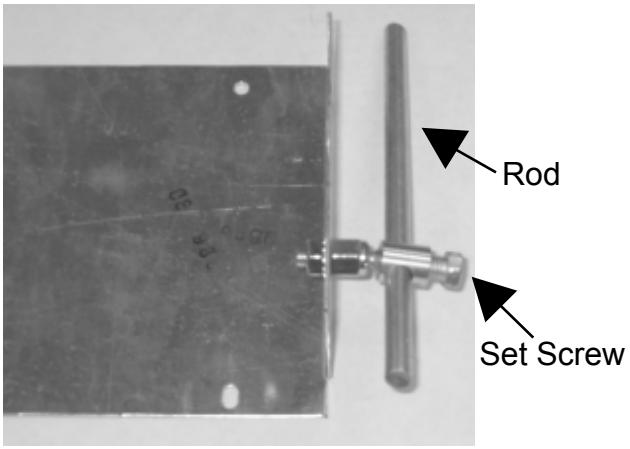
Manual Damper - 0 to 450 cfm of Outside Air, No Pressure Relief (Configuration Y). The amount of fresh air is determined by the position of the collar on the rod. To determine the desired quantity of fresh air:

a. With the indoor blower on, measure the quantity of supply air being discharged into the room with a balometer.

b. Now measure the quantity of the return air from the room. Subtract the return air from the supply air. The difference is the amount of fresh air.

c. Loosen the set screw that holds the collar onto the rod connected to the damper. Move the collar and tighten the set screw.

Figure 1. Damper Adjustment



d. Repeat steps a, b and c until the desired amount of fresh air is being introduced into the room.

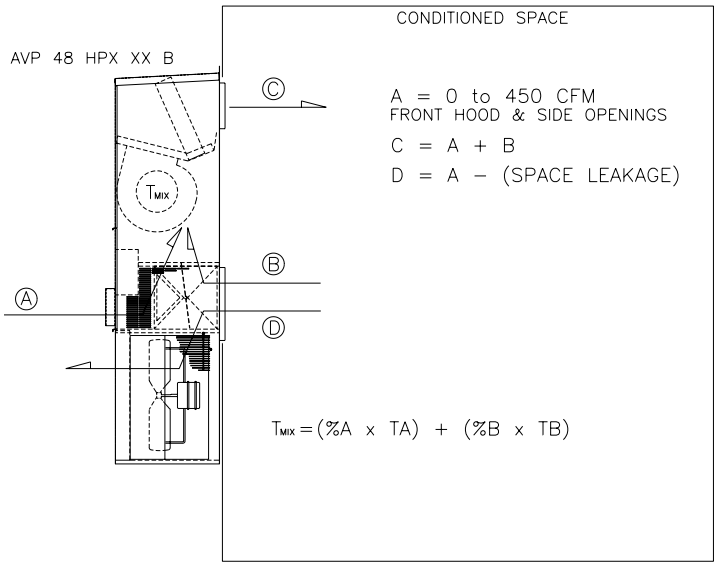
Important Note: Since Configuration Y does not have internal pressure relief, the fresh air must have a passage to the outside. If a passage is not available, the desired quantity of fresh air cannot be introduced into the room.

Motorized Damper - 0 to 450 cfm of Outside Air and Pressure Relief (Configuration B) and the Manual Damper with Pressure Relief (Configuration Z). The settings of the damper require a balometer and a thermometer for measuring internal and external temperatures.

a. Measure the total supply air with a balometer. If the supply air is controlled by a manual fan speed controller, make certain that the air flow is in accordance

with the air flow ((CFM) at various static pressures chart. This chart can be found in the Classic Product Data Sheet or the Installation Manual. This CFM is referred to as "C" in the illustration and equation below.

Figure 2. Damper Air Path



b. "A" is the quantity of outside air expressed as a percentage of "C". For example, if the supply air is 1,220 CFM and 300 CFM of outside air is required, "A" is 25% (300 CFM/1,220 CFM).

   Measure the temperature of the outside air.

   Multiply the temperature by "A".

c. "B" is the quantity of return air expressed as a percentage of "C". "A" and "B" must equal 100%.

   Measure the temperature of the indoor return air.

   Multiply the temperature of the indoor air by "B".

d. Calculate what the Tmix should be with the desired quantity of outside air.

   Measure the actual temperature of Tmix at the inlet to the supply air blower or at the inlet of the supply air blower.

   Adjust the damper blade until the measured value of the Tmix equals the calculated or desired value of Tmix.

   The motorized damper, Configuration B, can be controlled by an optional relay that allows additional external control with a choice of 24, 120 or 240V coils to regulate fresh air ventilation in response to a control located remote from the Classic™ heat pump.

9. **Electrical Supply:**

The power supply must have the appropriate voltage, phase, and ampacity for the

model selected. Voltage must be maintained above minimum specified values listed below. Refer to the unit data plate for ampacity requirements.

Table 1. Voltage Limitations

Electrical Rating Designations*	A	C	D
Nominal Voltage	208/230	208/230	460
Phase	1	3	3
Minimum Voltage	197	197	414
Maximum Voltage	253	253	506

* Letters refer to model number code designations.

3.1 ELECTRICAL

Classic heat pumps and air conditioners are built in a wide variety of configurations and options. The illustrations of the control center and the electrical schematics shown here are typical, but probably are not identical to your units. Please refer to the electrical schematic in each unit for the specific construction of that unit.

4.1 MAINTENANCE

Marvair® strongly recommends that the heat pump be serviced a minimum of twice a year – once prior to the heating season and once prior to the cooling season. At this time the filters, evaporator coil, condenser coil, the cabinet, and condensate drains should be serviced as described below. Also at this time, the heat pump should be operated in the cooling and heating cycles as described in Chapter 3, Start-Up. In addition to this seasonal check-out, the unit should be maintained as follows:

Air Filter

Replace the air filter whenever it is visibly dirty.

Indoor Coil

If the coil becomes clogged or dirty, it may be cleaned by careful vacuuming or with a commercial evaporator cleaning spray. DO NOT use a solvent containing bleach, acetone, or flammable substances. Turn power OFF before cleaning. Be careful not to wet any of the electrical components. Be sure the unit has dried before restarting.

Outdoor Coil

Periodically inspect the outdoor coil and the cabinet air reliefs for dirt or obstructions. Remove foreign objects such as leaves, paper, etc.

If the coil is dirty, it may be washed off with a commercial solvent intended for this purpose. TURN OFF POWER BEFORE CLEANING! Be sure that all electrical components are thoroughly dry before restoring power.

Cabinet

The cabinet may be cleaned with a sponge and warm, soapy water or a mild detergent. Do not use bleach, abrasive chemicals or harmful solvents.

Drains

Regularly check the primary and secondary condensate drains. The secondary drain has a stand pipe. An obstruction will force water to dump into the middle of the unit and drain out the sides of the Classic™ Heat Pump, causing discoloration of the side panels. If discoloration is noted, service the drains.

If a commercial drain solvent is used, flush out the drain pan and system with plenty of fresh water to prevent corrosion.

Lubrication

Oiling of the condenser fan motor or the evaporator blower motor is not recommended.

5.1 FUNCTION AND DESCRIPTION OF PRIMARY COMPONENTS

A. **Compressor.** All Classic units use a fully hermetic scroll compressor to minimize sound levels and maximize efficiency. Scroll compressors, like several other types of compressors, will only compress in one rotational direction. The direction of rotation is not an issue with single-phase compressors since they will always start and run in the proper direction. However, three phase compressors will rotate in either direction depending upon phasing of power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, it is imperative to confirm that the compressor is rotating in the proper direction at the initial field start-up of the system. Verification of proper rotation is made by observing that the suction pressure drops and the discharge pressure rises when the compressor is energized. An alternate method of verification for self contained system with small critical refrigerant charges, where the installation of gauges may be objectionable, can be made by monitoring the temperature of the refrigerant lines at the compressor. The temperature should rise on the discharge line while the suction line temperature decreases. Reverse rotation also results in a substantially reduced current draw when compared to tabulated values.

   There is no negative impact on durability caused by operating three phase compressors in the reversed direction for a short duration of time, usually defined as less than one hour. However, after several minutes of operation the compressor's internal protector will trip. The compressor will then cycle on the protector until the phasing is corrected. Reverse operation for longer than one hour may have a negative impact on the bearings.

B. **Indoor Blower and Motor.** The indoor blower assembly is an electronically commutated blower motor and dual blowers.

C. **Outdoor Air Mover.** The outdoor air mover is an axial fan with an asynchronous external rotor motor.

D. **Indoor/Outdoor Coils.** The coils are constructed of lanced, aluminum fins mechanically bonded to rifled, seamless copper tubes.

E. **Filter Drier** - The filter drier performs two functions in the refrigerant circuit. First,

it removes foreign particulate matter, e.g. dirt, scale, solder particles from the refrigerant to protect the compressor and other components in the refrigerant system with small openings or close tolerances. Second, it absorbs any moisture in the refrigerant with desiccant granules.

F. **High Pressure Switch and Loss of Charge Switch.** These switches render the compressor and outdoor fan motor inoperative whenever the limits of the high or loss of charge switches are exceeded. In the event of high pressure, the Classic™ unit will turn off and lockout. The high pressure switch opens at 610 psig and resets at 420 psig.

The Loss of Charge Switch is designed to guard against the operation of the system in the event of a loss of refrigerant. The loss of charge switch opens at 40 psig and closes at 60 psig.

In cold weather the pressure in the refrigerant system is low prior to operation. When the Classic™ unit starts in the heat pump mode during cold weather, low pressure could cause the system to lock out. To guard against nuisance lockouts, the Classic unit will not shut off if the Loss of Charge Switch (LPS) comes on during the first eight minutes of operation. In other words, the compressor will start and operate for eight minutes even with the LPS switch off.

The high and low pressure switches are resettable at the wall thermostat or by turning power off and then on to the Classic™ unit.

G. **Metering Devices.** The Classic uses a thermal expansion valve on the indoor (cooling) circuit and a fixed orifice on the outdoor (heating) circuit.

H. **Reversing Valve.** The reversing valve reverses the refrigerant's direction of flow in a heat pump, allowing the heat pump to switch from cooling to heating or heating to cooling.

I. **Exhaust Air Ventilation Blower** is used to exhaust classroom in the GreenWheel ERV ventilation option. The blower can exhaust up to 450 CFM of air from the classroom. In the standard configuration, both the exhaust and the intake ventilation blowers are controlled by a single speed controller. This speed controller permits the motor speed to be adjusted for the correct cfm of ventilation air. As an option, a second motor controller may be factory installed to allow independent control of the intake and exhaust air blowers. This allows pressurization of the classroom. All ventilation options have an intake air blower.

J. **Intake Ventilation Air Blower (GreenWheel ERV only)** is used to introduce outside air into the classroom.

K. **Electric Resistance Heat.** The heaters are available in various sizes (kW) for operation on 208/230v. 1Ø, 208/230 v. 3Ø, and 460v, 3Ø. The model number of the heat pump indicates the power supply and kW.

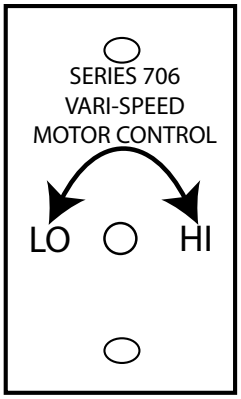
L. **Electric Resistance Heat Controls.** Included with the electric heat assembly are temperature switches designed to turn power off to the heaters if the temperature is too high. There are two types of temperature switches. The first is an auto-reset type that turns power off to the heater if it senses a temperature of 145°F. When the temperature drops to approximately 105°F, power is restored to the heaters. This auto-reset switch is in the low voltage circuit.

The second type of switch is a one time limit switch. If it senses a temperature of 300ºF, power is turned off to the elements. This switch does NOT reset when the temperature drops and must be replaced when it activates.

The number and location of both switches is determined by the power supply and the kW of the heaters.

M. **Ventilation Blower Fan Speed Control.** Factory setting for the indoor blower speed is full speed. If a lower speed setting is required, the blower motor speed control may be adjusted with a slotted screwdriver rotating the speed control as shown in Figure 3. Reference unit label for minimum required air flow settings for specific unit model.

Figure 3. Ventilation Blower Speed Control Adjustment Instructions



N. **Standard Ventilation Control.** The **GreenWheel® ERV** ventilation option is equipped with a **fresh air fan speed control**. The fresh air fan speed control operates both the ventilation intake and exhaust blowers together.

The **GreenWheel® ERV** ventilation option can be equipped with an exhaust fan air speed control, which controls the ventilation exhaust blower independently of the fresh air intake blower.

Demand Control Ventilation. A field or factory installed carbon dioxide sensor controls the ventilation damper and only opens the damper when CO_2 levels exceed a specified level. Demand control ventilation saves energy and utility costs by ventilating the classroom based upon occupancy.

Note: Not available on manual fresh air damper ("B") configuration.

O. **Outdoor Thermostat.** Factory set at 40°F, this thermostat determines the outdoor temperature at which the supplemental electric heat turns on. This may be field adjusted to the desired temperature setting by rotating the adjustment knob.

P. **Low Ambient Control** (Standard on units with economizers, optional on all other units.) The low ambient control permits mechanical cooling when outdoor ambient temperatures are low. The control uses a reverse-acting high pressure switch to cycle the condenser fan motor according to liquid refrigerant pressure conditions. Switch closure and fan operation occurs when the pressure reaches 400 PSIG. The switch opens again when the refrigerant pressure falls to 245 PSIG. Therefore, the outdoor

fan always starts after the compressor, and it will cycle frequently during normal operation at low outdoor conditions.

Q. **Compressor Time Delay.** The time delay module (delay on make) prevents the compressor from restarting immediately after interruption of power. The delay interval, which is adjustable from .2 to 8 minutes, protects the compressor by allowing internal refrigerant pressures to equalize. The time delay does not effect the electric heat circuit.

6.1 TROUBLESHOOTING

In diagnosing common faults in the heat pump system, develop a logical thought pattern as used by experienced technicians. The charts which follow are not intended to be an answer to all problems but only to guide the technician's thinking. Through a series of yes and no answers, follow the logical path to a likely conclusion.

A novice technician should use these charts like a road map. Remember that the chart should clarify a logical path to the problem's solutions.

Electrical Checks Flow Chart

<table>
<tr><td colspan="4">Unit Running?</td></tr>
<tr><td colspan="3">NO</td><td>YES</td></tr>
<tr><td colspan="3">Thermostat Problem?</td><td rowspan="15">Go to Mechanical Check for Cooling or Heating</td></tr>
<tr><td colspan="2">YES - Repair and Recheck</td><td>NO</td></tr>
<tr><td colspan="3">Transformer Problem?</td></tr>
<tr><td colspan="2">YES - Repair and Recheck</td><td>NO</td></tr>
<tr><td colspan="3">Voltage on Compressor Side of Contactor?</td></tr>
<tr><td>YES</td><td colspan="2">NO</td></tr>
<tr><td>Run Capacitor</td><td colspan="2">Voltage on Line Side of Contactor?</td></tr>
<tr><td>Compressor Internal Overload Open</td><td>NO</td><td>YES</td></tr>
<tr><td>Compressor Winding Open</td><td>Circuit Breakers or Fuses Open</td><td>Compressor Contactor</td></tr>
<tr><td>Unit Wiring and Connections</td><td>YES</td><td>High Pressure Cut-Out</td></tr>
<tr><td rowspan="4"></td><td>Compressor Winding Grounded</td><td>Low Pressure Cut-Out</td></tr>
<tr><td>Outdoor Fan Motor Grounded</td><td>Compressor Time Delay</td></tr>
<tr><td>Grounded Capacitor</td><td rowspan="2">Unit Wiring and Connections</td></tr>
<tr><td>Replace Fuses or Reset Breakers and Recheck System</td></tr>
</table>

Cooling Mechanical Checks Flow Chart

<table>
<tr><th colspan="4">Unit Running?</th></tr>
<tr><td colspan="3">YES</td><td>NO</td></tr>
<tr><td colspan="3">Pressure Problems?</td><td rowspan="14">Go to Electrical Checks Flow Chart</td></tr>
<tr><th>High Head Pressure</th><th>Low Head Pressure</th><th>Low Suction Pressure</th></tr>
<tr><td>Dirty Outdoor Filter</td><td>Low on Charge</td><td>Dirty Filters</td></tr>
<tr><td>Inoperative Outdoor Fan</td><td>Low Ambient Temperature</td><td>Dirty Indoor Coil</td></tr>
<tr><td>Overcharge</td><td>Inoperative Compressor Valves</td><td>Inadequate Indoor Air Flow</td></tr>
<tr><td>Recirculation of Outdoor Air</td><td>Outdoor Check Valve Closed</td><td>Inoperative Indoor Blower</td></tr>
<tr><td>Non-condensibles</td><td>Restricted Indoor Metering Device</td><td>Low on Charge</td></tr>
<tr><td>Higher than Ambient Air Entering Outdoor Coil</td><td>Restricted Filter Drier</td><td>Restricted Indoor Metering Device</td></tr>
<tr><td>Wrong Outdoor Fan Rotation</td><td>Reversing Valve Failure</td><td>Restriction in System</td></tr>
<tr><td rowspan="5"></td><td rowspan="5"></td><td>Recirculation of Indoor Air</td></tr>
<tr><td>Wrong Indoor Blower Rotation</td></tr>
<tr><td>Inadequate Ducts</td></tr>
<tr><td>Outdoor Check Valve Closed</td></tr>
<tr><td>Restricted Filter Drier</td></tr>
</table>

Heating Mechanical Checks Flow Chart

Unit Running?			
YES			NO
Pressure Problems?			Go to Electrical Checks Flow Chart
High Head Pressure	**Low Head Pressure**	**Low Suction Pressure**	
Dirty Filters	Low on Charge	Dirty Outdoor Coil	
Dirty Indoor Coil	Low Indoor Temperature	Inadequate Air Flow Over Outdoor Coil	
Inoperative Indoor Blower	Closed Indoor Check Valve	Inoperative OD Fan	
Overcharge	Inoperative Compressor Valves	Low on Charge	
Inadequate Indoor Air Flow	Restricted Outdoor Metering Device	Restricted Outdoor Metering Device	
Non-condensibles	Restricted Filter Drier	Restriction in System	
Wrong Indoor Blower Rotation	Reversing Valve Failure	Closed Indoor Check Valve	
Inadequate Ducts		Recirculation of Out-door Air	
		Restricted Filter Drier	

Defrost Mechanical Checks Flow Chart

Defrost System		
No Defrost	**Incomplete Defrost**	**Excessive Defrost**
Reversing Valve Stuck	Poor Sensor Location	Wrong Defrost Control Timer Setting
No Defrost Timer Control Power	Wrong Defrost Control Timer Setting	Poor Sensor Location
Failed Defrost Control	Failed Defrost Relay (doesn't stop O.D. Fan)	Low System Charge
Failed Defrost Relay	Thermostat Satisfies During Defrost	Wind Affecting in Defrost
Loose Default Sensor		

Subcooling Calculation

1. Measure the liquid pressure at the liquid line service valve.
2. Convert the liquid line pressure to saturated temperature. See tables below.
3. Measure the liquid line temperature at the liquid line service valve.
4. Compare the liquid line temperature to the saturated temperature.
5. The difference between saturated temperature and liquid line temperature is the subcooling. Subcooling normal range 12° to 20°.

Superheat Calculation

1. Measure the suction pressure at the suction line service valve.
2. Convert the suction line pressure to saturated temperature. See tables below.
3. Measure the suction line temperature approximately 6" to 8" from the compressor.
4. Compare the suction line temperature to the saturated temperature.
5. The difference between saturated temperature and suction line temperature is the superheat. Superheat normal range 12° to 18°

Temperature Pressure Chart

Temp. (°F)	R-22 PSIG	R-410A PSIG		Temp. (°F)	R-22 PSIG	R-410A PSIG		Temp. (°F)	R-22 PSIG	R-410A PSIG
-40	0.5	11.0		25	48.7	86.0		90	168.4	273.0
-35	2.6	14.2		30	54.9	95.5		95	181.8	294.1
-30	4.9	17.8		35	61.5	105.7		100	195.9	316.4
-25	7.4	21.8		40	68.5	116.6		105	210.7	339.9
-20	10.1	26.1		45	76.0	128.3		110	226.3	364.6
-15	13.2	30.8		50	84.0	140.8		115	242.7	390.5
-10	16.5	35.9		55	92.5	154.1		120	259.9	417.7
-5	20.0	41.5		60	101.6	168.2		125	277.9	446.3
0	23.9	47.5		65	111.2	183.2		130	296.8	476.3
5	28.2	54.1		70	121.4	199.2		135	316.5	507.6
10	32.8	61.2		75	132.2	216.1		140	337.2	540.5
15	37.7	68.8		80	143.6	234.0		145	258.8	574.8
20	43.0	77.1		85	155.7	253.0		150	381.5	610.6

Troubleshooting Chart

WARNING

DISCONNECT ALL POWER TO UNIT BEFORE SERVICING. CONTACTOR MAY BREAK ONLY ONE SIDE. FAILURE TO SHUT OFF POWER CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

Problem/Symptom	Likely Cause(s)	Correction
Unit will not run.	1. Power off or loose electrical connection. 2. Thermostat out of calibration - set too high. 3. Defective contactor. 4. Blown fuse/tripped breaker. 5. Transformer defective. 6. High pressure control open. 7. Low pressure control open.	1. Check for correct voltage at unit disconnect. Check for correct voltage at contactor in unit. 2. Reset. 3. Check for 24 volts at contactor coil - replace if contacts are open. 4. Replace fuses/reset breaker. 5. Check wiring - replace transformer. 6. Reset. 7. Reset.
Outdoor fan runs, compressor doesn't.	1. Run capacitor defective 2. Loose connection. 3. Compressor stuck, grounded or open motor winding, open internal overload. 4. Low voltage condition.	1. Replace. 2. Check for correct voltage at compressor - check and tighten all connections. 3. Wait at least 2 hours for overload to reset. If still open, replace the compressor. 4. Add start kit components.
Insufficient cooling.	1. Improperly sized unit. 2. Improper indoor air flow. 3. Incorrect refrigerant charge. 4. Air, non-condensibles or moisture in system.	1. Recalculate load. 2. Check - should be approximately 400 CFM per ton. 3. Charge per procedure. 4. Recover refrigerant, evacuate and recharge, add filter drier.
Compressor short cycles.	1. Incorrect voltage. 2. Defective overload protector. 3. Refrigerant undercharging.	1. At compressor terminals, voltage must be ±10% of nameplate marking when unit is operating. 2. Replace - check for correct voltage. 3. Add refrigerant.
Registers sweat.	1. Low indoor air flow.	1. Increase speed of blower or reduce restriction - replace air filter.
High head - low vapor pressures.	1. Restriction in liquid line, expansion device or filter drier. 2. Flow check piston size too small. 3. Incorrect capillary tubes.	1. Remove or replace defective component. 2. Change to correct size piston. 3. Change assembly coil.
High head - high or normal vapor pressures - cooling mode.	1. Dirty outdoor coil. 2. Refrigerant overcharge. 3. Outdoor fan not running. 4. Air or non-condensibles in system.	1. Clean coil. 2. Correct system charge. 3. Repair or replace. 4. Recover refrigerant, evacuate and recharge.

Troubleshooting Chart (cont'd)

Problem/Symptom	Likely Cause(s)	Correction
Low head - high vapor pressures.	1. Flow check piston size too large. 2. Defective compressor valves. 3. Incorrect capillary tubes.	1. Change to correct size piston. Replace compressor. 2. Replace coil assembly.
Low vapor - cool compressor - iced indoor coil.	1. Low indoor air flow. 2. Operating below 55°F outdoors. 3. Moisture in system.	1. Increase speed of blower or reduce restriction - replace air filter. 2. Add low ambient kit. 3. Recover refrigerant - evacuate and recharge - add filter drier.
High vapor pressure.	1. Excessive load. 2. Defective compressor.	1. Recheck load calculation. 2. Replace.
Fluctuating head and vapor pressures..	1. TXV hunting. 2. Air or non-condensibles in system.	1. Check TXV bulb clamp - check air distribution on coil - replace TXV. 2. Recover refrigerant, evacuate and recharge.
Gurgle or pulsing noise at expansion device or liquid line.	1. Air or non-condensibles in system.	1. Recover refrigerant, evacuate and recharge.

Service Analyzer Charts

Compressor Overheating		
Problem/Symptom	**Likely Cause(s)**	**Correction**
High superheat.	1. Low charge. 2. Faulty metering device. 3. High internal load. 4. Restriction in liquid line. 5. Low head pressure.	1. Check system charge. 2. Restricted cap tube, TXV. Power element superheat adjustment. Foreign matter stopping flow. 3. Hot air (attic) entering room. Heat source on; miswired or faulty control. 4. Drier plugged. Line kinked. 5. Low charge. Operating in low ambient temperatures.
Low voltage.	1. Loose wire connections. 2. Dirty or pitted compressor contactor contacts. 3. Power company problem, transformer. 4. Undersized wire feeding unit.	1. Check wiring. 2. Replace contactor. 3. Have problem corrected before diagnosis continues. 4. Correct and complete diagnosis.
High voltage.	1. Power company problem.	1. Have problem corrected.

Compressor Overheating (cont'd)		
Problem/Symptom	**Likely Cause(s)**	**Correction**
High head pressure.	1. Overcharge. 2. Dirty heat pump coil. 3. Faulty or wrong size heat pump fan motor. 4. Faulty outdoor blower. 5. Recirculation of air. 6. Additional heat source. 7. Non-condensibles	1. Check system charge. 2. Clean coil. 3. Replace fan motor. 4. Replace blower. Replace with correct rotation motor. 5. Correct installation. 6. Check for recirculating from other equipment. 7. Recover refrigerant, evacuate and recharge system.
Short cycling of compressor.	1. Faulty pressure control. 2. Loose wiring. 3. Thermostat. 4. TXV. 5. Capillary Tube. 6. Low charge. 7. Low evaporator air flow. 8. Faulty run capacitor. 9. Faulty internal overload.	1. Replace pressure control. 2. Check unit wiring. 3. Located in supply air stream. Differential setting too close. Customer mis-use. 4. Internal foreign matter. Power element failure. Valve too small. Distributor tube/tubes restricted. 5. Restricted with foreign matter. Kinked. I.D. reduced from previous compressor failure. 6. Check system charge. 7. Dirty coil. Dirty filter. Duct too small or restricted. 8. Replace. 9. Replace compressor.
Faulty compressor valves.	1. Fast equalization/low pressure difference.	1. Replace compressor and examine system to locate reason.
Electrical		
Voltage present on load side of compressor contactor and compressor won't run.	1. Run capacitor. 2. Internal overload. 3. Compressor windings.	1. Check with ohmmeter. 2. Allow time to reset. 3. Check for current ohms.
Voltage present on line side of compressor contactor only.	1. Thermostat. 2. Compressor control circuit.	1. Check for control voltage to compressor-contactor coil. 2. High pressure switch. Low pressure switch. Compressor turned off/on control or interlock.

Electrical (cont'd)		
Problem/Symptom	**Likely Cause(s)**	**Correction**
No voltage on line side of compressor contactor.	1. Blown fuses or tripped circuit breaker. 2. Improper wiring.	1. Check for short in wiring or unit. 2. Recheck wiring diagram.
Improper voltage.	1. High voltage. 2. Low voltage. 3. Single phasing (3 phase).	1. Power supply problem. 2. Power supply problem. Wiring undersized. Loose connections. 3. Check incoming power and fusing.
Contamination		
Moisture.	1. Poor evacuation on installation or during service.	1. In each case, the cure is the same, recover refrigerant. Add filter drier, evacuate and recharge.
High head pressure.	1. Non-condensibles air.	
Unusual head and suction readings.	1. Wrong refrigerant.	
Foreign matter - copper fittings.	1. Copper tubing cuttings.	
Copper oxide.	1. Dirty copper piping.	
Welding scale.	1. Nitrogen not used.	
Soldering flux.	1. Adding flux before seating copper part way.	
Excess soft solder.	1. Wrong solder material.	
Loss of Lubrication		
Low suction pressure.	1. Low charge. 2. Refrigerant leaks.	1. Check system charge. 2. Repair and recharge.
Cold, noisy compressor - slugging.	1. Dilution of oil with refrigerant.	1. Observe piping guidelines.
Noisy compressor.	1. Migration.	1. Check crankcase heater.
Cold, sweating compressor.	1. Flooding.	1. Check system charge.
Low load.	1. Reduced air flow. 2. Thermostat setting.	1. Dirty filter. Dirty coil. Wrong duct size. Restricted duct. 2. Advise customer.
Short cycling of compressor.	1. Faulty pressure control. 2. Loose wiring. 3. Thermostat.	1. Replace control. 2. Check all control wires. 3. In supply air stream, out of calibration. Customer misuse.
Flooding		
Poor system control using a TXV.	1. Loose sensing bulb. 2. Bulb in wrong position. 3. Wrong size TXV. 4. Improper superheater setting.	1. Secure the bulb and insulate. 2. Relocate bulb. 3. Use correct replacement. 4. Adjust, if possible, replace if not.

Flooding (cont'd)		
Problem/Symptom	**Likely Cause(s)**	**Correction**
Poor system control using capillary tubes.	1. Overcharge. 2. High head pressures. 3. Evaporator air flow too low.	1. Check system charge. 2. Dirty heat pump. Restricted air flow. Recirculation of air. 3. Adjust air flow to 400 CFM/Ton.
Thermostatic Expansion Valves		
High superheat, low suction pressure.	1. Moisture freezing and blocking valve. 2. Dirt or foreign material blocking valve. 3. Low refrigerant charge. 4. Vapor bubbles in liquid line. 5. Misapplication of internally equalized valve. 6. Plugged external equalizer line. 7. Undersized TXV. 8. Loss of charge from power head sensing bulb. 9. Charge migration from sensing bulb to power head (warm power head with warm, wet cloth. Does valve operate correctly now?) 10. Improper superheat adjustment (only applicable to TXV with adjustable superheat settings).	1. Recover charge, install filter drier, evacuate system, recharge. 2. Recover charge, install filter-drier, evacuate system, recharge. 3. Correct the charge. 4. Remove restriction in liquid line. Correct the refrigerant charge. Remove non-condensible gases. 5. Use correct TXV. 6. Remove external equalizer line restriction. 7. Replace with correct valve. 8. Replace power head or complete TXV. 9. Ensure TXV is warmer than sensing bulb. 10. Adjust superheat setting counter-clockwise.
Valve feeds too much refrigerant, with low superheat and higher than normal suction pressure.	1. Moisture causing valve to stick open. 2. Dirt or foreign material causing valve to stick open. 3. TXV seat leak (a gurgling or hissing sound is heard at the TXV during the off cycle, if this is the cause). Not applicable to bleed port valves. 4. Oversized TXV. 5. Incorrect sensing bulb location. 6. Low superheat adjustment (only applicable to TXV with adjustable superheat setting). 7. Incorrectly installed or restricted external equalizer line.	1. Recover refrigerant, replace filter drier, evacuate system and then recharge. 2. Recover refrigerant, replace filter drier, evacuate system and recharge. 3. Replace the TXV. 4. Install correct TXV. 5. Install bulb with two mounting straps, in 2:00 or 4:00 position on suction line, with insulation. 6. Turn superheat adjustment clockwise. 7. Remove restriction, or relocate external equalizer.

Thermostatic Expansion Valves (cont'd)		
Problem/Symptom	**Likely Cause(s)**	**Correction**
Compressor flood back upon start-up.	1. Any of the causes listed under symptoms of problem 2.	1. Any of the solutions listed under solutions of problem 2.
Superheat is low to normal with low suction pressure.	1. Unequal evaporator circuit loading. 2. Low load or air flow entering evaporator coil.	1. Ensure air flow is equally distributed through evaporator. Ensure proper piston. Check for blocked distributor tubes. 2. Ensure blower is moving proper air CFM. Remove/correct any air flow restriction.
Superheat and suction pressure fluctuate (valve is hunting)	1. Expansion valve is oversized. 2. Sensing bulb is affected by liquid refrigerant or refrigerant oil flowing through suction line. 3. Unequal refrigerant flow through evaporator circuits. 4. Improper superheat adjustment (only possible with TXV having superheat adjustment. 5. Moisture freezing and partially blocking TXV.	1. Install correct TXV. 2. Relocate sensing bulb in another position around the circumference of the suction line. 3. Ensure proper distributor piston is inserted. Ensure sensing bulb is located properly. Check for block distributor tubes. 4. Replace TXV or adjust superheat. 5. Recover refrigerant, change filter drier, evacuate system and recharge.
Valve does not regulate at all.	1. External equalizer line not connected or line plugged in. 2. Sensing bulb lost its operating charge. 3. Valve body damaged during soldering or by improper installation.	1. Connect equalizer line in proper location, or remove any blockage. 2. Replace TXV. 3. Replace TXV.

7.1 PROCEDURE FOR FILING A WARRANTY CLAIM

156 Seedling Drive • Cordele, GA 31015 • P.O. Box 400 • Cordele, GA 31010-0400
Phone 800-841-7854 • 229-273-3636 • Fax 229-276-1479 • Svc Pager 800-204-8210

MARVAIR SERVICE REQUEST / PURCHASE ORDER FOR SERVICE

DATE RECEIVED	TIME NOTIFIED	DATE DISPATCHED	TIME DISPATCHED	CUSTOMER PO#	MARVAIR SERVICE PO #
		Marvair Use	Marvair Use		Marvair Use

Person requesting service:_____

Company requesting service:_____

Phone #:_____ Fax #:_____

Site Information:

Point of Contact:_____ Company:_____

Phone:_____ Alt. Name & Phone:_____

Site Address:_____ Site# / Bldg# / Name:_____

City:_____ ST._____ Zip:_____

Site Access Information:_____

Equipment Repair Information:

MODEL #	SERIAL NUMBER	NATURE OF PROBLEM

Marvair Use - Service Company Information:

Service Company:_____ Contact:_____

Phone #:_____ Fax:_____

Address:_____ Labor Rate:_____

City:_____ ST._____ Zip:_____

If included here, please review and sign our service centers Warranty Policy Information/Agreement then fax back to 229-273-5154. Invoices will be paid in accordance with Labor Allowance Guidelines included with this PO. Failure to follow these guidelines and labor allowances may result in delayed payment. All over time work must be approved in advance. All times allowed for entry into the refrigerant circuit include evacuation, recharge, refrigerant and drier change. Service centers are required to notify Marvair if site travel will exceed 1 hour each way – additional travel time must be approved in advance. Detailed invoices or service tech call sheet/work orders are required to be submitted with invoices for payment. Service Tech's should document work in detail and include/verify model(s) and serial number(s) of the equipment and include Marvair's PO on all documentation. Marvair will provide contractors with warranty replacement parts for service calls please contact us at 800-841-7854.

8.1 WARRANTY

If any part of your Marvair® Air Conditioner, Heat Pump or Unit Ventilator fails because of a manufacturing defect within fifteen months from the date of original shipment from Marvair or within twelve months from the date of original start-up, whichever is the earlier date, Marvair will furnish without charge, EXW Cordele, Georgia, the required replacement part. Any transportation, related service labor, diagnosis calls, filter, driers, and refrigerant are not included. The owner must provide proof of the date of the original start-up. The owner's registration card filed with Marvair, the contractor's invoice, the certificate of occupancy or similar document are examples of proof of the date of the original start-up.

In addition, if the hermetic compressor fails because of a manufacturing defect within sixty months from the date of original shipment from Marvair®, Marvair will furnish without charge, EXW Cordele, Georgia, the required replacement part. Any related service labor, diagnosis calls, filter, driers and refrigerant are not included. Marvair will pay for non-priority shipping costs of the compressor during the first twelve months of the warranty period. After the first twelve months of the warranty period, all costs of shipment and risk of loss during the shipment of the compressor shall be the responsibility of the owner.

The owner of the product may ship the allegedly defective or malfunctioning product or part to Marvair®, at such owner's expense, and Marvair will diagnose the defect and, if the defect is covered under this warranty, Marvair will honor its warranty and furnish the required replacement part. All costs for shipment and risk of loss during shipment of the product to Marvair and back to the owner shall be the responsibility and liability of the owner. Upon written request by an owner, Marvair may arrange for remote diagnosis of the allegedly defective or malfunctioning product or part but all costs for transportation, lodging and related expenses with regard to such diagnostic services shall be the responsibility and liability of the owner.

An owner requesting performance under this Warranty shall provide reasonable access to the allegedly defective or malfunctioning product or part to Marvair® and its authorized agents and employees.

This warranty applies only to products purchased and retained for use within the U.S.A., Canada, and Mexico. This warranty does not cover damage caused by improper installation, misuse of equipment or negligent servicing.

THIS WARRANTY CONSTITUTES THE EXCLUSIVE REMEDY OF ANY PURCHASER OF A MARVAIR® HEAT PUMP OR AIR CONDITIONER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE, TO THE FULLEST EXTENT PERMITTED BY LAW. IN NO EVENT SHALL ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE EXCEED THE TERMS OF THE APPLICABLE WARRANTY STATED ABOVE AND MARVAIR SHALL HAVE NO OTHER OBLIGATION OR LIABILITY. IN NO EVENT SHALL MARVAIR BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR MONETARY DAMAGES.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE-TO-STATE. Some states do not allow limitations or exclusions, so the above limitations and exclusions may not apply to you.

9.1 PARTS LIST

Classic™ Heat Pump Parts List - Models HVPA

PARTS		HVPA24HP	HVPA30HP	HVPA36HP	HVPA42HP	HVPA49HP	HVPA60HP
Compressor, Scroll	HPA[1]	10333 (K5)	10298	10349	10352	10310	10313
	HPF[2]	10384	10378	10385	10388	10388	10389
	HPC[3]	10327	10299	10350	10353	10311	10314
	HPD[4]	10328	10300	10351	10354	10312	10315
Capacitor, Scroll Compressor ufd/volts	HPA	50280	50315	50321	50321	50327	50315 (2)
		35 / 370	40 / 370	45 / 370	45 / 370	70 / 440	40 / 370
Capacitor, Scroll Compressor ufd/volts	HPF	50315	50323	50323	50159	50159	50320 (2)
		40 / 370	60 / 370	60 / 370	80 / 370	80 / 370	40 / 440
Compressor Plug/Cord, 80" Long	HPA/HPF	19012	19012	19012	19012	19012	19012
	HPC/HPD	19013	19013	19013	19013	19013	19013
Sound Blanket, Compressor		20052	20052	20052	20054	20054	20054
Indoor Coil		60385 16 x 33	60360 16 x 36	60360 16 x 36	60340 18 x 36	60027 24 x 36.5	60027 24 x 36.5
Thermal Expansion/Check Valve	P/N	20362	20362	20366	20366	20337	20337
	Feeders	See Below	See Below	See Below	See Below	4/D209/20"	4/D209/20"
Distributor Assembly	P/N	20367	20367	20367	20368	Included	Included
	Feeders	20"	20"	20"	20"	20"	20"
	Nozzle	J2	J2	J2	J3	E3	E3
Coil, Evaporator, Reheat (G Option5)		60051	60148	60148	60148	60133	60133
Valve, 3-Way Diverting (G Option)		20257	20257	20257	20257	20257	20257
Coil, Solenoid Valve (G Option)		20028	20028	20028	20028	20028	20028
Outdoor Coil		60380	60370	60370	60355	60072 (2)	60072 (2)
Distributor, Outdoor, Heating		20119 2 x 3/16" x 20"	20119 2 x 3/16" x 20"	20119 2 x 3/16" x 20"	20121 4 x 3/16" x 20"	20338 (2) 6 x 3/16" x 32"	20348 (2) 6 x 3/16" x 32"
Orifice, Outdoor, Heating	P/N	20103	20097	20064	20082	20083 (Inc.)	20082 (2)
	Size	0.045	0.049	0.053	0.057	0.055	0.057
Indoor Motor, Double Shafted, 240 Volt, ECM		40087	40081	40081	40081	40090	40090
Blower, L.H.		30050	30090	30090	30090	30090	30090
Blower, R.H.		30055	30092	30092	30092	30092	30092
Blower Wheel / Housing		9-7T DD	10-8 DD	10-8 DD	10-8 DD	10-8 DD	10-8 DD
Digital Control Unit		70363	70363	70363	70363	70363	70363
Cable Assembly		01511	01511	01511	01511	01511	01511
Power Cable Assembly		01512	01512	01512	01512	01512	01512
Outdoor Motor		40096	40098	40098	40098	40051	40051
HP/RPM		1/4 1075	1/3 825	1/3 825	1/3 825	1/2 825	1/2 825
Capacitor, Outdoor		50350	50240	50240	50240	50360	50360
Fan Blade		30115	30135	30135	30135	30149	30149
		T2004-22	T2404-20	T2404-20	T2404-20	T2404-34	T2404-34
Reversing Valve, RV		20135B	20135B	20135B	20135B	20258A	20258A
Solenoid Coil, Reversing Valve		50225B	50225B	50225B	50225B	50225A	50225A
Filter Drier		70388	70388	70388	70388	70428	70428
High Pressure Control (610 Open, 420 Close)		70343	70343	70343	70343	70343	70343
Loss of Charge Switch (40 Open, 60 Close)		70342	70342	70342	70342	70342	70342
Accumulator (Orifice)		70320 (.040)	70330 (.040)	70330 (.040)	70330 (.040)	70340 (.055)	70340 (.055)
Defrost Control (DFC)		20173	20173	20173	20173	20173	20173
Motor, Economizer (EPA)		40101	40101	40101	40101	40101	40101
Enthalpy Control,)		70230	70230	70230	70230	70230	70230
Mixed Air Relay (MAR)		50164	50164	50164	50164	50164	50164
Mixed Air Sensor (MAS)		70229	70229	70229	70229	70229	70229
GreenWheel Blower, Flanged, 400 CFM		50780 (2)	50780 (2)	50780 (2)	50780 (2)	50780 (2)	50780 (2)
Capacitor, 4 ufd @ 370 Volts,		50256 (2)	50256 (2)	50256 (2)	50256 (2)	50256 (2)	50256 (2)
Energy Recovery Wheel		01226	01226	01226	01226	01226	01226
Motor, GreenWheel Drive		40007	40007	40007	40007	40007	40007
Capacitor, 2 ufd @ 370 Volts		50326	50326	50326	50326	50326	50326
Fan Speed Controller (230 Volt)		70049	70049	70049	70049	70049	70049
Belting, 3/16" Round Urethane		P/80390	P/80390	P/80390	P/80390	P/80390	P/80390

(continued on following page)

PARTS		HVPA24HP	HVPA30HP	HVPA36HP	HVPA42HP	HVPA49HP	HVPA60HP
Contactor, Compressor, 30 Amp	HPA	50020	50020	50020	50020	n/a	n/a
Contactor, Compressor, 40 Amp	HPA	n/a	n/a	n/a	n/a	50030	50030
Contactor, Compressor, 30 Amp	HPC/HPD	50040	50040	50040	50040	50040	50040
Control Board, Heat Pump,		92030	92030	92030	92030	92030	92030
Relay, Fan Blower Control (BTR)	Standard	50419	50419	50419	50419	50419	50419
Relay, B-Damper	B-Damper6	50420	50420	50420	50420	50420	50420
Actuator, Motor, B-Damper		40107	40107	40107	40107	40107	40107
Lockout Relay (LOR)		50214	50214	50214	50214	50214	50214
Clip for Low Vibration		01257	01257	01257	01257	01257	01257
Relay, Defrost (DFR)		50200	50200	50200	50200	50200	50200
Relay, Heat/Cool, DPDT, 24 Volt		50420	50420	50420	50420	50420	50420
Relay, S-Circuit (SR)		50164	50164	50164	50164	50164	50164
Relay, Outdoor Fan Motor (OFR)	HPD	50205	50205	50205	50205	50205	50205
Relay, Heat/Blower (HBR)	HPD	50205	50205	50205	50205	50205	50205
Sensor, Open 56 F, Close 28 F		50102	50102	50102	50102	50102	50102
Resistor, 4.7K Ohm, 1/2 Watt, 5% Tolerance		50293	50293	50293	50293	50293	50293
Relay, DPST		50205	50205	50205	50205	50205	50205
Controller, PLC,		70275	70275	70275	70275	70275	70275
Relay, Indoor Blower (IBR) Used with PLC		P/50182	P/50182	P/50182	P/50182	P/50182	P/50182
Low Voltage Transformer (50 VA)		50199	50199	50199	50199	50199	50199
Transformer (460 to 230 Volts),		50147 1.5 KVA	50147 1.5 KVA	50147 1.5 KVA	50147 1.5 KVA	P/50007 2.0 KVA	P/50007 2.0 KVA
Transformer (460 to 230 Volts), GreenWheel		P/50007 2.0 KVA	P/50007 2.0 KVA	P/50007 2.0 KVA	P/50007 2.0 KVA	P/50008 3.0 KVA	P/50008 3.0 KVA
Contactor, Heat, 2 Pole, 30A (4 to 5 kW)		50020	50020	50020	50020	50020	50020
Contactor, Heat, 3 Pole, 40A (6 to 10 kW)		50030	50030	50030	50030	50030	50030
Contactor, Heat, 3 Pole, 30A	HPC/HPD	50040	50040	50040	50040	50040	50040
Heater, 4 kW, 240 Volts	HPA	70413	n/a	n/a	n/a	n/a	n/a
Heater, 5 kW, 240 Volts	HPA	70412	70412	70412	70412	70412	70412
Heater, 6 kW, 240 Volts	HPA/HPC	70444	70444	70444	70444	70444	70444
Heater, 8 kW, 240 Volts	HPA	70414	70414	70414	n/a	n/a	n/a
Heater, 9 kW, 240 Volts	HPA/HPC	70445	70445	70445	70445	70445	70445
Heater, 10 kW, 240 Volts	HPA	70411	70411	70411	70411	70411	70411
Heater, 12 kW, 240 Volts	HPA/HPC	70446	70446	70446	70446	70446	70446
Heater, 15 kW, 240 Volts	HPA/HPC	70410	70410	70410	70410	70410	70410
Heater, 6 kW, 460 Volts	HPD	70440	70440	70440	70440	70440	70440
Heater, 9 kW, 460 Volts	HPD	70441	70441	70441	70441	70441	70441
Heater, 12 kW, 460 Volts	HPD	70442	70442	70442	70442	70442	70442
Heater, 15 kW, 460 Volts	HPD	70443	70443	70443	70443	70443	70443
Dual Limit Control (145°F Open, 115°F Reset, 175°F Fail)		70006	70006	70006	70006	70006	70006
One Time Limit Control (165° F Open/Fail)		70005	70005	70005	70005	70005	70005
Filter, Heavy Duty, 1" Thick Dimensions (inches)		80136 16 x 30	80139 22 x 36.5	80139 22 x 36.5	80139 22 x 36.5	81199 (2) 18 x 24	81199 (2) 18 x 24
Filter, Pleated, 2" Thick		80138	80162	80162	80162	81257 (2)	81257 (2)
LAUSD Circuit Breakers (Bold and Hi-Lighted are Standard)	MFS	HPA (2 Pole)		HPC (3 Pole)		HPD (3 Pole)	
	15	n/a		70128		70432	
	20	n/a		70170		70436	
	25	70127		70108		70433	
	30	70171		70109		70434	
	35	70107		70121		70438	
	40	70185		70177		70435	
	45	70179		70333		n/a	
	50	70113		70182		n/a	
	60	70178		70183		n/a	

[1]HPA=208/230v, 1ø, 60 Hz.
[2]HPF=208/230v, 3ø, 50 Hz.
[3]HPC=208/230v, 3ø, 60 Hz.
[4]HPD=460v. 30248, 60 Hz.
[5]G option, Hot Gas Reheat
[6]B option= motorized fresh air damper

Classic™ Heat Pump Parts List - Models HVPSA

PART		HVPSA36HP	HVPSA42HP	HVPSA49HP	HVPSA60HP
Compressor, Scroll	HPA[1]	10334	10345	10337	10340
	HPC[2]	10335	10346	10338	10341
	HPD[3]	10336	10355	10339	10342
Capacitor, Scroll Compressor ufd/volts	HPA	50315 40 / 370	50321 45 / 370	50321 45 / 370	50315 (Two) 40 / 370
Compressor Plug/Cord, 80" Long	HPA	19012	19012	19012	19012
	HPC/HPD	19013	19013	19013	19013
Plug, Unloader Solenoid		01554	01554	01554	01554
Comfort Alert	HPA	19014	19014	19014	19014
Comfort Alert	HPC/HPD	19015	19015	19015	19015
Sound Blanket, Compressor		20063	20063	20063	20063
Indoor Coil		60360	60340	60027	60027
Thermal Expansion/Check Valve		20366	20366	20337	20337
Distributor Assembly		20367	20368	Included	Included
Coil, Evaporator, Reheat (G Option4)		60148	60148	60133	60133
Valve, 3-Way Diverting (G Option4)		20257	20257	20257	20257
Coil, Solenoid Valve (G Option4)		20028	20028	20028	20028
Outdoor Coil		60370	60355	60072 (2)	60072 (2)
Distributor, Outdoor, Heating		20119	20121	20338 (2)	20348 (2)
Orifice, Outdoor, Heating		20064	20082	20083 (Included)	20082 (2)
Indoor Motor, Double Shafted, 240 Volt, ECM		40081	40081	40090	40090
Blower, L.H.		30090	30090	30090	30090
Blower, R.H.		30092	30092	30092	30092
Blower Wheel / Housing		10-8 DD	10-8 DD	10-8 DD	10-8 DD
Digital Control Unit		70363	70363	70363	70363
Cable Assembly		01511	01511	01511	01511
Power Cable Assembly		01512	01512	01512	01512
Outdoor Motor		40098	40098	40051	40051
(HP/RPM)		1/3 825	1/3 825	1/2 825	1/2 825
Capacitor, Outdoor		50240	50240	50360	50360
Fan Blade		30135	30135	30149	30149
Filter Drier (Reversible)		70388	70388	70428	70428
High Pressure Control (610 Open, 420 Close)		70343	70343	70343	70343
Loss of Charge Switch (40 Open, 60 Close)		70342	70342	70342	70342
Accumulator (Orifice)		70330 (.040)	70330 (.040)	70340 (.055)	70340 (.055)
Defrost Control (DFC)		20173	20173	20173	20173
Reversing Valve, RV		20135B	20135B	20258A	20258A
Solenoid Coil, RV		50225B	50225B	50225A	50225A
Motor, Economizer (EPA)		40101	40101	40101	40101
Enthalpy Control, (EC)		70230	70230	70230	70230
Mixed Air Relay (MAR)		50164	50164	50164	50164
Mixed Air Sensor (MAS)		70229	70229	70229	70229
GreenWheel Blower, Flanged, 400 CFM		50780 (2)	50780 (2)	50780 (2)	50780 (2)
Capacitor, 4 ufd @ 370 Volts, Square		50256 (2)	50256 (2)	50256 (2)	50256 (2)
Energy Recovery Wheel		01226	01226	01226	01226
Motor, GreenWheel Drive		40007	40007	40007	40007
Capacitor, 2 ufd @ 370 Volts		50326	50326	50326	50326
Fan Speed Controller (230 Volt)		70049	70049	70049	70049
Belting, 3/16" Round Urethane		P/80390	P/80390	P/80390	P/80390
Contactor, Compressor, 30 Amp	HPA	50020	50020	n/a	n/a
Contactor, Compressor, 40 Amp	HPA	n/a	n/a	50030	50030
Contactor, Compressor, 30 Amp	HPC/HPD	50040	50040	50040	50040
Control Board, Heat Pump,		92030	92030	92030	92030

(continued on following page)

PART		HVPSA36HP	HVPSA42HP	HVPSA49HP	HVPSA60HP
Relay, Fan Blower Control (BTR)	Standard	50419	50419	50419	50419
Relay, B-Damper	B-Damper	50420	50420	50420	50420
Actuator, Motor, B-Damper		40107	40107	40107	40107
Lockout Relay (LOR)		50214	50214	50214	50214
Clip for Low Vibration		01257	01257	01257	01257
Relay, Defrost (DFR)		50200	50200	50200	50200
Relay, Heat/Cool, DPDT, 24 Volt		50420	50420	50420	50420
Relay, S-Circuit (SR)		50164	50164	50164	50164
Relay, Outdoor Fan Motor (OFR)	HPD	50205	50205	50205	50205
Relay, Heat/Blower (HBR)	HPD	50205	50205	50205	50205
Sensor, Open 56° F, Close 28° F		50102	50102	50102	50102
Resistor, 4.7K Ohm, 1/2 Watt, 5% Tolerance		50293	50293	50293	50293
Relay, DPST		50205	50205	50205	50205
Controller, PLC,		70275	70275	70275	70275
Relay, Indoor Blower (IBR) Used with PLC		P/50182	P/50182	P/50182	P/50182
Low Voltage Transformer (50 VA)		50199	50199	50199	50199
Transformer (460 to 230 Volts),		50147 1.5 KVA	50147 1.5 KVA	P/50007 2.0 KVA	P/50007 2.0 KVA
Transformer (460 to 230 Volts), GreenWheel ERV		P/50007 2.0 KVA	P/50007 2.0 KVA	P/50008 3.0 KVA	P/50008 3.0 KVA
Contactor, Heat, 2 Pole, 30A (4 to 5 kW)		50020	50020	50020	50020
Contactor, Heat, 3 Pole, 40A (6 to 10 kW)		50030	50030	50030	50030
Contactor, Heat, 3 Pole, 30A	HPC/HPD	50040	50040	50040	50040
Heater, 4 kW, 240 Volts	HPA	n/a	n/a	n/a	n/a
Heater, 5 kW, 240 Volts	HPA	70412	70412	70412	70412
Heater, 6 kW, 240 Volts	HPA/HPC	70444	70444	70444	70444
Heater, 8 kW, 240 Volts	HPA	70414	n/a	n/a	n/a
Heater, 9 kW, 240 Volts	HPA/HPC	70445	70445	70445	70445
Heater, 10 kW, 240 Volts	HPA	70411	70411	70411	70411
Heater, 12 kW, 240 Volts	HPA/HPC	70446	70446	70446	70446
Heater, 15 kW, 240 Volts	HPA/HPC	70410	70410	70410	70410
Heater, 6 kW, 460 Volts	HPD	70440	70440	70440	70440
Heater, 9 kW, 460 Volts	HPD	70441	70441	70441	70441
Heater, 12 kW, 460 Volts	HPD	70442	70442	70442	70442
Heater, 15 kW, 460 Volts	HPD	70443	70443	70443	70443
Dual Limit Control (145oF Open, 115oF Reset, 175oF Fail)		70006	70006	70006	70006
One Time Limit Control (165o F Open/Fail)		70005	70005	70005	70005
Filter, Heavy Duty, 1" Thick		80139 22 x 36.5	80139 22 x 36.5	81199 (2) 18 x 24	81199 (2) 18 x 24
Filter, Pleated, 2" Thick		80162	80162	81257 (2)	81257 (2)
Circuit Breaker		70178 (HPA)	70183 (HPC)	70435 (HPD)	

1HPA=208/230v., 1ø, 60 Hz.
2 HPC=208/230v., 3ø, 60 Hz.
3 HPC=460v., 3ø, 60 Hz.
4G option = Hot Gas Reheat